Claims 1-15 are pending, with claim 1 being independent.

Allowable Claims

Applicants thank the Examiner for indicating that claims 3, 5-7, and 10 recite allowable subject matter.

Claim Rejections – 35 U.S.C. §103

Independent claim 1 recites an apparatus for optically pumping a laser-active solid body with pumping light coupled into the solid body through an end surface of the solid body. The apparatus includes a laser-active solid body, a reflector, and a surface. The laser-active solid body includes an end surface through which pumping light is coupled into the solid body and a lateral surface through which pumping light exits the solid body. The reflector surrounds the laser-active solid body at a distance from the lateral surface of the solid body for reflecting light that exits the solid body back towards the solid body, thereby forming an annular gap between the solid body and the reflector. The surface diffusively scatters and spatially homogenizes light that is coupled into the solid body through the end surface of the solid body and that exits the solid body through the lateral surface. The surface is selected from the group consisting of the lateral surface and a surface of the reflector.

Claims 1, 2, 4, and 13-15 have been rejected as allegedly being unpatentable over WO/93/23899 (Tidwell) in view of U.S. Patent No. 5,373,527 (Taniu). Applicants request withdrawal of this rejection because Tidwell fails to describe or suggest a reflector surrounding a laser-active solid body at a distance from the lateral surface of the solid body for reflecting light that exits the solid body back towards the solid body to thereby form an annular gap between the solid body and the reflector, as recited in claim 1, and because one of ordinary skill in the art would not have been motivated to modify Tidwell in the manner suggested.

Tidwell relates to a laser system 2 having a solid state lasing medium 4 that receives pump radiation from a pump source 10 through an end surface 6 of the medium 4. See Tidwell at page 4, lines 11-19, and Fig. 1. The solid state lasing medium 4 has a circumferential side

surface 8 that reflects the pump radiation by total internal reflection. See Tidwell at page 4, lines 11-27 and Fig. 1. A reflecting coating can be applied to the side surface 8 to support this reflection. See Tidwell at page 4, lines 28 -35 and Fig. 1. The reflective coating can be specular or diffusive and the side surface 8 can be treated to provide a rough surface to reflect radiation. See Tidwell at page 5, lines 1-14. However, there is no teaching or suggestion that the coating surrounding Tidwell's side surface 8 is at a distance from the side surface 8 to form an annular gap between the side surface 8 and the coating. Rather, as Tidwell explains, the "reflective coating is applied to the side surface 8." See Tidwell at page 5, line 1.

In view of the deficiency in Tidwell, the Office cites Taniu and argues that "Taniu teaches a pumped solid state medium wherein a reflective surface (smooth, mirror like, fig. 2) is spaced from the solid state body (fig. 1) forming a gap" such that it "would have been obvious ... to combine the solid state medium of Tidwell with the spaced apart reflective surface of Taniu in order to allow for any escaped pumping light to be returned to the gain medium." Applicants respectfully disagree for the following reasons.

First, Taniu does not describe or suggest a "a surface for diffusively scattering and spatially homogenizing light" that is spaced from a solid body. In particular, although a reflecting tube 2 is spaced from a lasing medium 3, the reflecting tube 2 is not a surface for diffusively scattering light and spatially homogenizing light, as recited in claim 1. Rather, as Taniu explains, the reflecting tube 2 has a mirrored surface to provide for light convergence at an optical axis center of the reflecting tube. See Taniu at col. 6, lines 25-54 and Fig. 1. Therefore, Taniu teaches away from a modification of Tidwell that would provide a surface for diffusively scattering and spatially homogenizing light. As Taniu explains, it is desirable to produce a "high concentration of excitation light at the optical axial center of the lasing medium, thus increasing laser beam quality." See Taniu at col. 1, line 47 to col. 2, line 33.

Second, one of ordinary skill would not have been motivated to modify Tidwell with the reflecting tube 2 of Taniu because any such modification would render inoperable Tidwell's laser system 2, which requires that pump radiation be input into the lasing medium 4 through the end surface 6. In Taniu, by contrast, the pumping light from light source 1 enters the side surface of

the lasing medium 3 after passing through an aperture 2d and reflecting off the reflecting tube 2. See Taniu at Fig. 1.

Third, one of ordinary skill would not have been motivated to modify Tidwell with the reflecting tube 2 of Taniu because any such modification would render inoperable Tidwell's laser system 2, which requires that pump radiation be input into the lasing medium 4 through the end surface 6. In Taniu, by contrast, the pumping light enters the side surface of the lasing medium 3: "the reflecting tube ... admits the light from the ... excitation source into the reflecting tube in a direction perpendicular to the ... central axis" of the laser medium. See Taniu at col. 2, lines 33-45.

For at least these reasons, claim 1 is allowable over Tidwell and Taniu. Claims 2, 4, and 13-15 depend from claim 1, and are allowable for at least the same reasons that claim 1 is allowable.

Claims 8 and 9 have been rejected as allegedly being unpatentable over Tidwell in view of Taniu and U.S. Publication No. 2002/0118718 (Honea). Claims 8 and 9 depend from claim 1, which was rejected as being obvious over Tidwell in view of Taniu. As discussed above, Tidwell fails to describe or suggest a reflector surrounding a laser-active solid body at a distance from the lateral surface of the solid body for reflecting light that exits the solid body back towards the solid body to thereby form an annular gap between the solid body and the reflector, as recited in claim 1. While Honea may describe the use of a high refractive index medium, it does not remedy the failure of Tidwell to describe or suggest this subject matter. In Honea, the multi-layer coating around a side of a laser slab 22 is not located at a distance from the side of the laser slab 22 in such a manner as to form an annular gap between the laser slab 22 and the multi-layer coating. Rather, the multi-layer coating is applied directly to one or more sides of the laser slab. See Honea at paragraph 0027 and Fig. 5. Accordingly, claim 1 is allowable over any possible combination of Tidwell, Taniu, and Honea, and claims 8 and 9 are allowable for at least the reasons that claim 1 are allowable.

Claims 11 and 12 have been rejected as allegedly being unpatentable over Tidwell in view of Taniu and U.S. Application No. 5,048,044 (Ireland). Claims 11 and 12 depend from

claim 1, which was rejected as being obvious over Tidwell in view of Taniu. As discussed above, Tidwell fails to describe or suggest a reflector surrounding a laser-active solid body at a distance from the lateral surface of the solid body for reflecting light that exits the solid body back towards the solid body to thereby form an annular gap between the solid body and the reflector, as recited in claim 1. Moreover, as discussed in the reply of July 25, 2007, one of ordinary skill in the art would not have been motivated to modify Tidwell in the manner suggested based on the additional disclosure of Ireland, as discussed below.

In particular, Ireland does not describe or suggest a "a surface for diffusively scattering and spatially homogenizing light" that is spaced from a solid body. Although a reflective diffraction grating 96 is spaced from a laser member 90, the diffraction grating 96 is not a surface for diffusively scattering light and spatially homogenizing light, as recited in claim 1. Rather, as Ireland explains, the diffraction grating 96 has a "regular profile having a period s" that will provide for constructive interference of light reflected from the diffraction grating 96. See Ireland at col. 6, line 64 to col. 7, line 51 and Fig. 14. Additionally, one of ordinary skill would not have been motivated to modify Tidwell with the diffraction grating design of Ireland because any such modification would render inoperable Tidwell's laser system 2, which requires that pump radiation be input into the lasing medium 4 through the end surface 6. In Ireland, by contrast, the pumping light enters the side surface 94 of the laser member 90 such that the light is in a "direction normal to the optical axis." See Ireland at col. 7, lines 38-51. As also previously discussed, any modification of Tidwell's laser system 2 to include a reflective diffraction grating of Ireland spaced from the side surface 8 would change the principle of operation of Tidwell, which explains that the reflective coating is diffusive (not diffractive) to provide for a greater number of path lengths of the pumping radiation that is reflected back and forth within the lasing medium 4. See Tidwell at page 5, lines 1-6. Moreover, Ireland teaches away from such a modification of Tidwell at col. 7, lines 51-61. As Ireland explains in this passage, in the only design in which the pumping light travels in a direction having a substantial component along the optical axis, "no special arrangement is needed for reflecting the pumping light after the initial pass" because the pumping light "will undergo total internal reflection at the end of the initial

pass" in such a design. The "special arrangement" to which Ireland refers is arranging the reflective diffraction grating 96 at a distance from the laser member 90. Moreover, even though Ireland mentions in this passage that pumping light can have a substantial component along an optical axis, Ireland never suggests that such pumping light would enter the laser member 90 at an end surface, as in Tidwell's laser system 2. Rather, Ireland explains that to obtain a substantial component along the optical axis, an optical device is positioned between the laser diodes and the (lateral surface 94) of the laser member 90. See Ireland at col. 7, lines 51-57.

Accordingly, claim 1 is allowable over any possible combination of Tidwell, Taniu, and Ireland, and claims 11 and 12 are allowable for at least the reasons that claim 1 are allowable.

Conclusion

In conclusion, applicant submits that all claims are in condition for allowance. The fee of $120.00 for the One Month Extension of Time to and including December 27, 2007 is being filed concurrently with the Electronic Filing System (EFS). Please apply all charges or credits to deposit account 06-1050, referencing Attorney Docket No. 15540-020US1.

Respectfully submitted,

Date: December 27, 2007

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